



Great Smoky Mountains National Park

Rehabilitation of Morton Mountain and Chimney Tops Mountain Tunnels

**Newfound Gap Road – US 441
Sevier County, Tennessee**

Best Practices

2003 Joint Ventures

“Partners in Stewardship”

November 17-20, 2003

Agenda

- Project
- Location/Setting
- Stakeholders
- Partnerships
- Solution



Problem

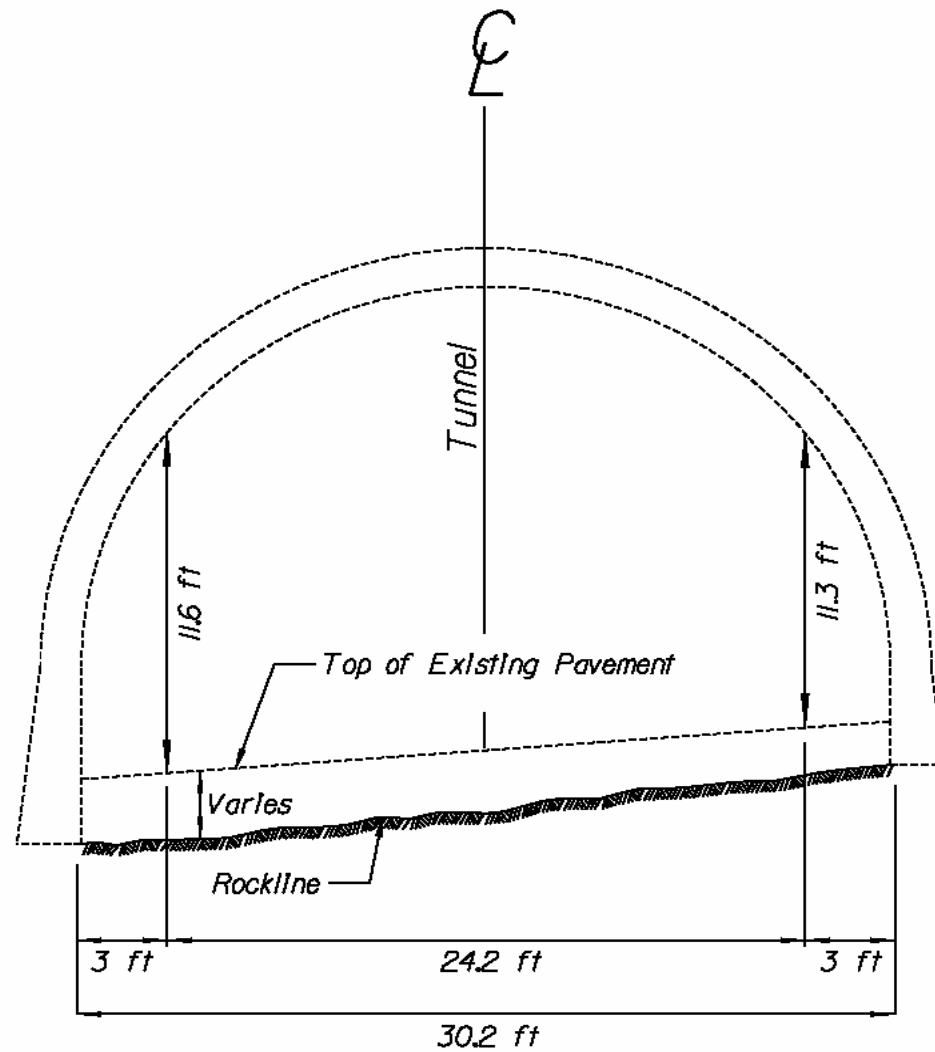
- Inadequate vertical clearance for increasing number of oversized vehicles (ie. buses and RV's)
- Leakage, icing, and falling concrete from tunnel lining.
- Substandard roadside and approach barriers.
- Dark, curvilinear tunnel.
- Limited information on road conditions available to motorists and gateway communities.



Goals and Objectives

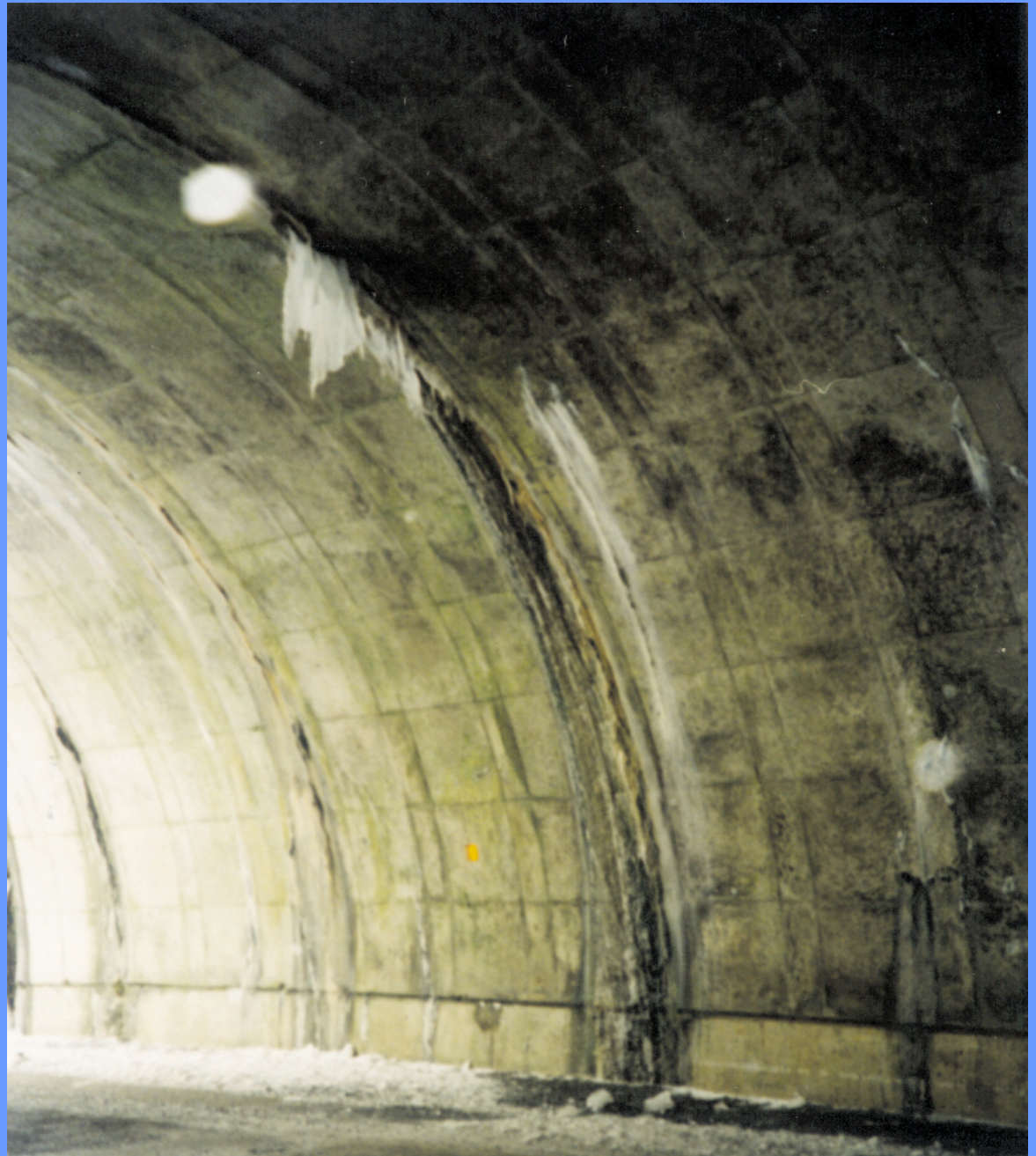
- **FLH Prepared the Environmental Document for the NPS**
- **Accommodate Economic Interests of Local Communities**
- **Safe for RVs, Trailers, and Tour Buses**
- **Minimize Visitor Impact**
- **Environmental Sensitivity**
- **Early Completion**
- **Design Research – Technology**





TYPICAL EXISTING TUNNEL SECTION

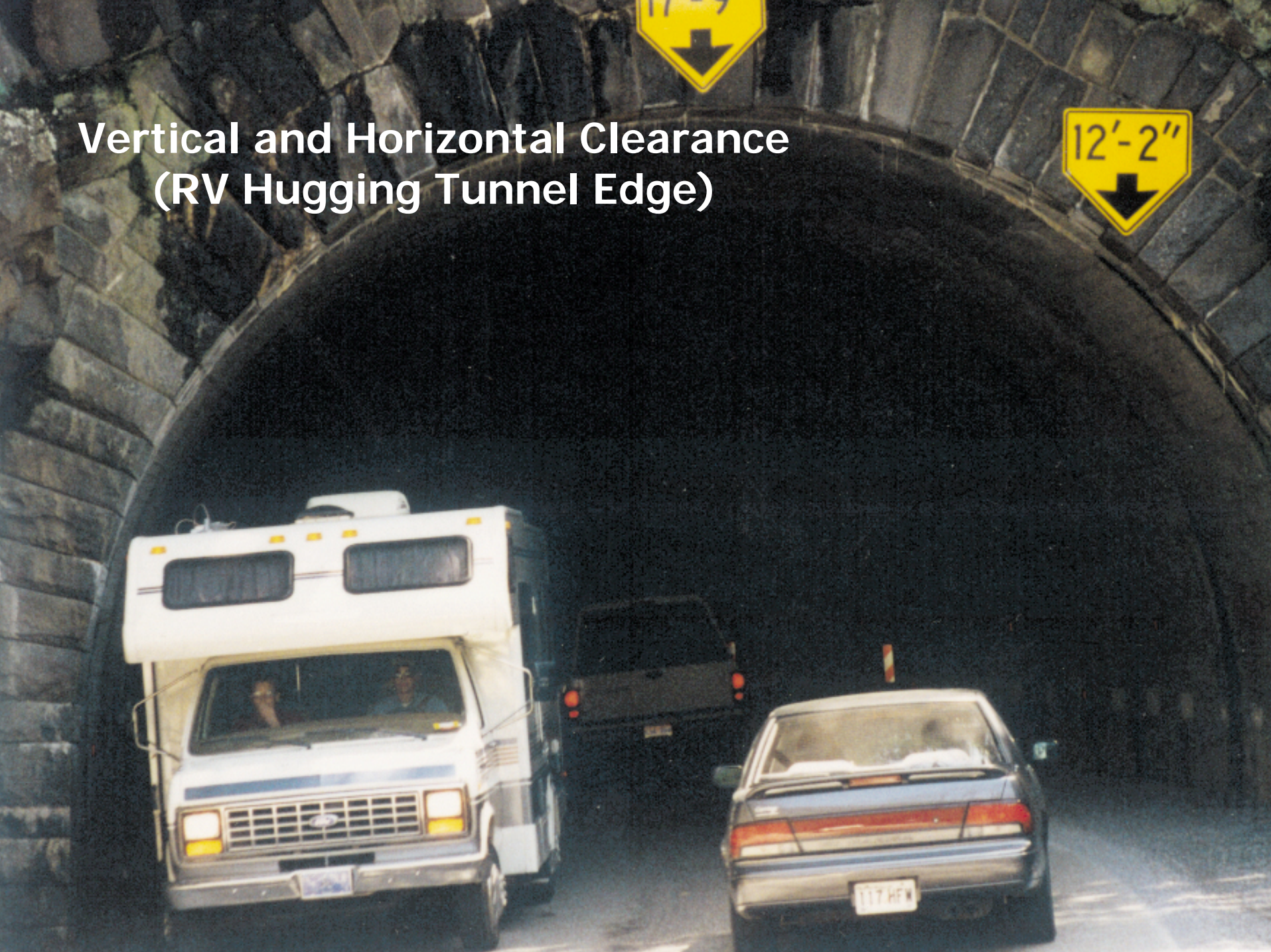
Leakage, Icing and Lining Deterioration





Icing and Vertical Clearance

Vertical and Horizontal Clearance (RV Hugging Tunnel Edge)





RV Crossing Centerline

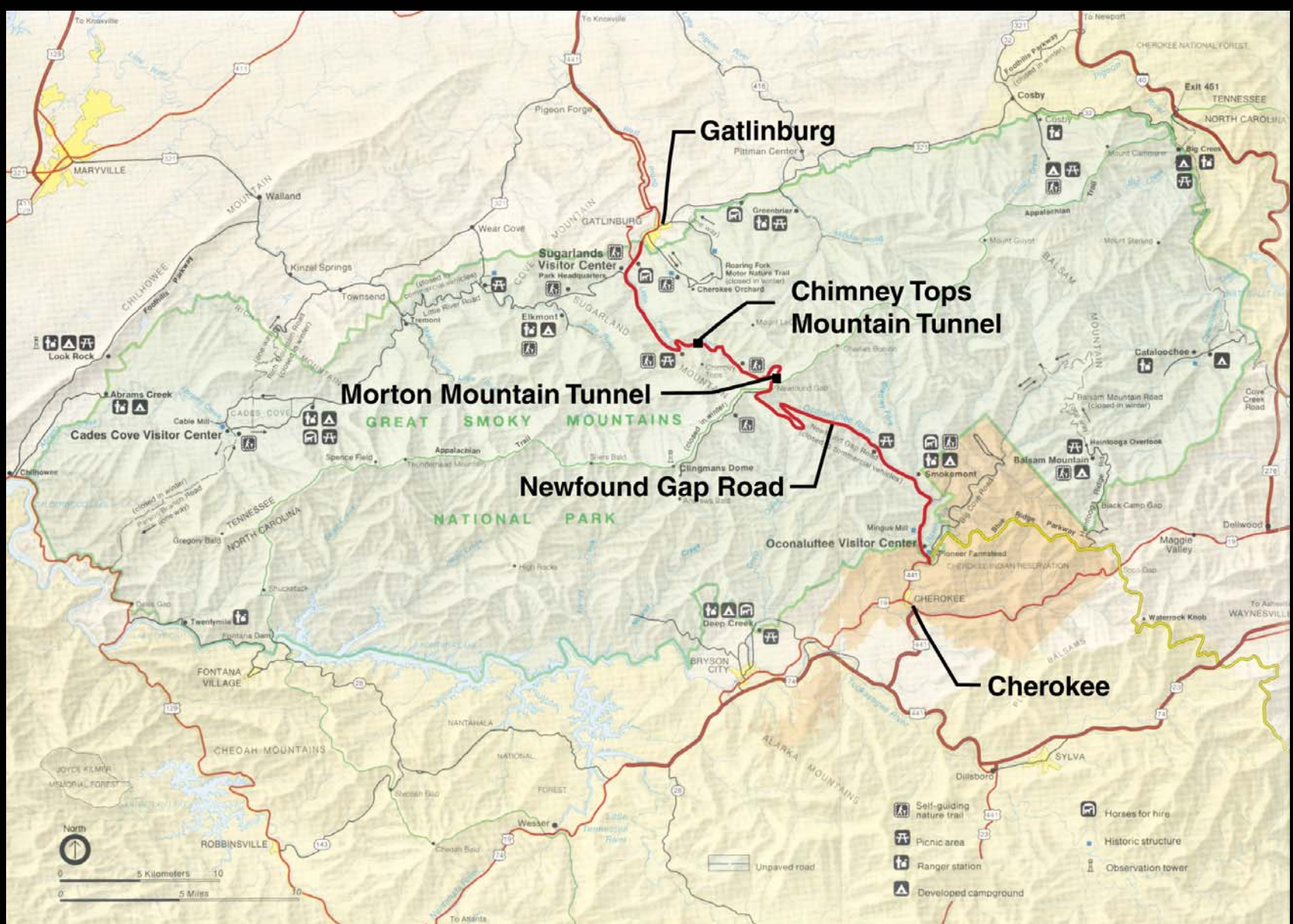
Location/Setting

Great Smoky Mountains National Park

- Area - 800 sq. miles (NC and TN)
- National Park Established – 1934
- International Biosphere Reserve - 1976
- World Heritage Site – 1983
- Over 1500 plant, 230 bird, 65 mammal, and dozens of fish species
- Visitation – 9.5 million people/year



View of Great Smoky Mountains National Park



VICINITY MAP: Modifications to Chimney Tops Mountain and Morton Mountain Tunnels

Stakeholder Groups

- Traffic
- Natural Resources
- Cultural Resources
- Business Groups
- Park Visitors
- Technology Opportunities
- Construction Contractors
- Gateway Communities



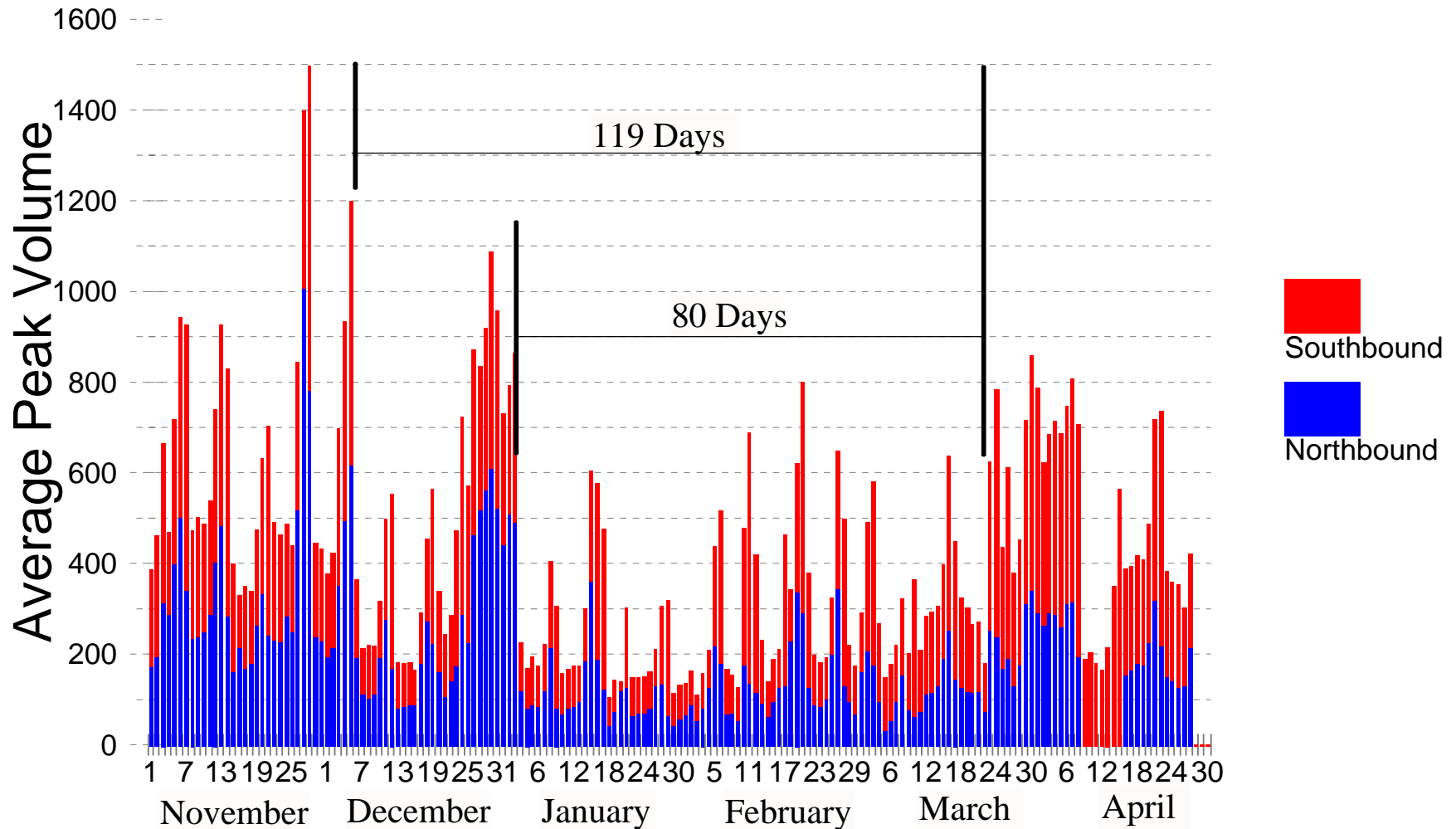
Traffic

- FHWA
- NPS
- NC DOT
- TN DOT
- Cherokee DOT
- Sevier County, TN
- Swain County, NC
- Traveling Public



Average Peak Hourly Volumes by Date

November 1999 to April 2000



Natural Resources

- **NPS**
- **TN Dept. of Environment and Conservation**
- **US Fish and Wildlife Service**
- **TN Natural Heritage Program**
- **Environmental Interest Groups**





Black Bear



Abrams Falls

Cultural Resources

- NPS
- TN SHPO
- ACHP
- THPO's



Business Groups

- Sevier County Chamber of Commerce
- City of Gatlinburg
- Eastern Band of Cherokee Indians
- Harrah's Casino
- Cherokee Office of Travel and Promotion
- Swain County Chamber of Commerce
- Local Business Owners



Technology Opportunities

- **TN DOT**
- **NC DOT**
- **NPS**
- **FHWA**
- **Charles Blalock and Sons**
- **Lanford Bros. Co**
- **R. E. Burns**



Testing of Milling Operations on Bedrock



Sample Tunnel Lining Installation

Lickstone Ridge Tunnel
Blue Ridge Pkwy





Ground Penetrating Radar Testing

Great Smoky Mountains National Park



U.S. DEPARTMENT OF TRANSPORTATION
Federal Highway Administration

Construction Contractors

- Charles Blalock and Sons
- Lanford Bros. Co
- R. E. Burns

Gateway Communities

- Gatlinburg, TN
- Pidgeon Forge, TN
- Sevierville, TN
- Marysville, TN
- Cherokee, NC
- Maggie Valley, NC



Partnerships

Tennessee DOT

North Carolina DOT



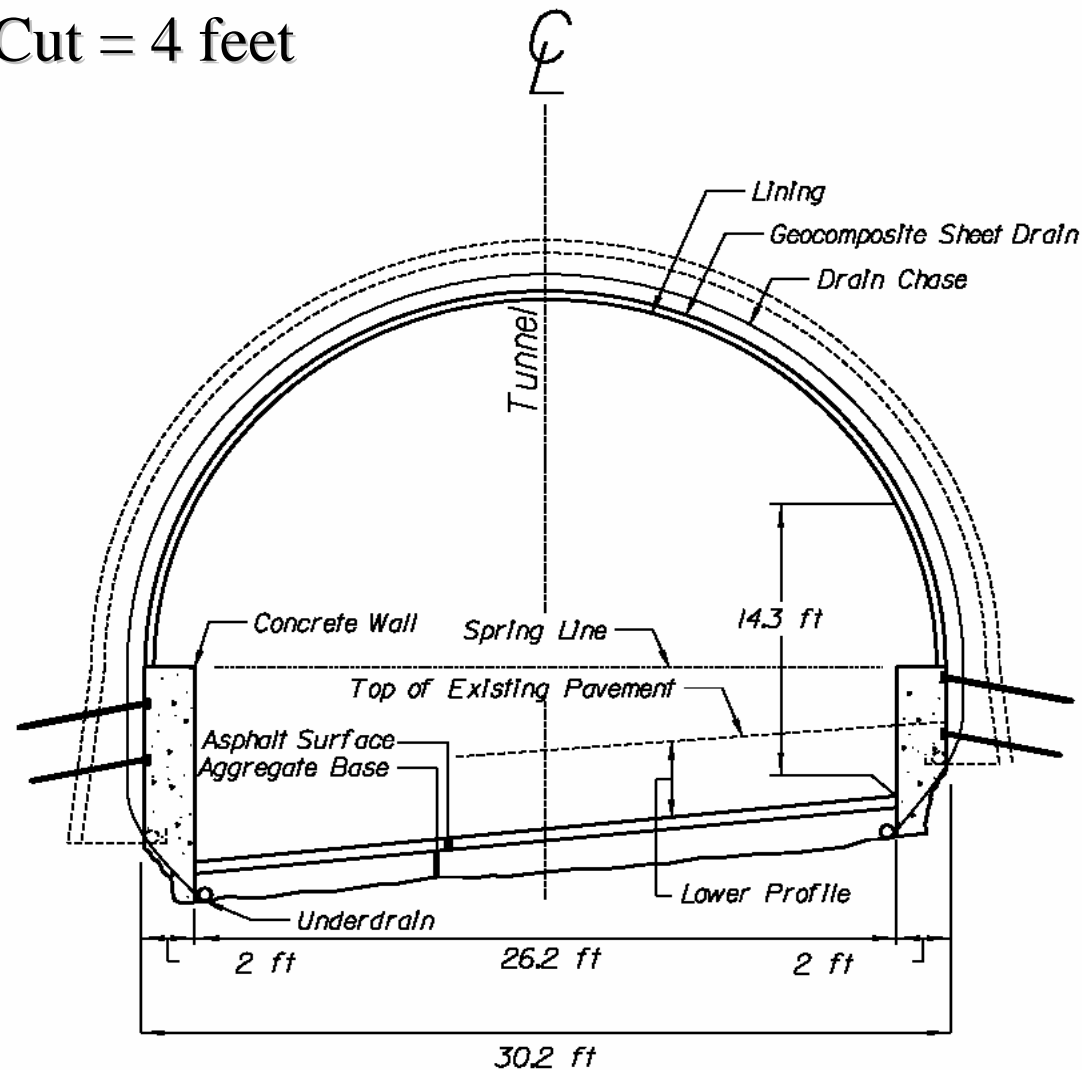
These agencies initiated and promoted lasting partnerships between the various stakeholder groups to develop and implement an acceptable solution to this transportation problem.

Solution

Rehabilitate Morton Mountain and Chimney Tops Mountain Tunnels

- Lower roadway and tunnel grade to improve vertical and horizontal clearance
- Rehabilitate tunnel lining to prevent leakage, icing, and falling concrete
- Install a new tunnel drainage system
- Construct masonry safety barriers

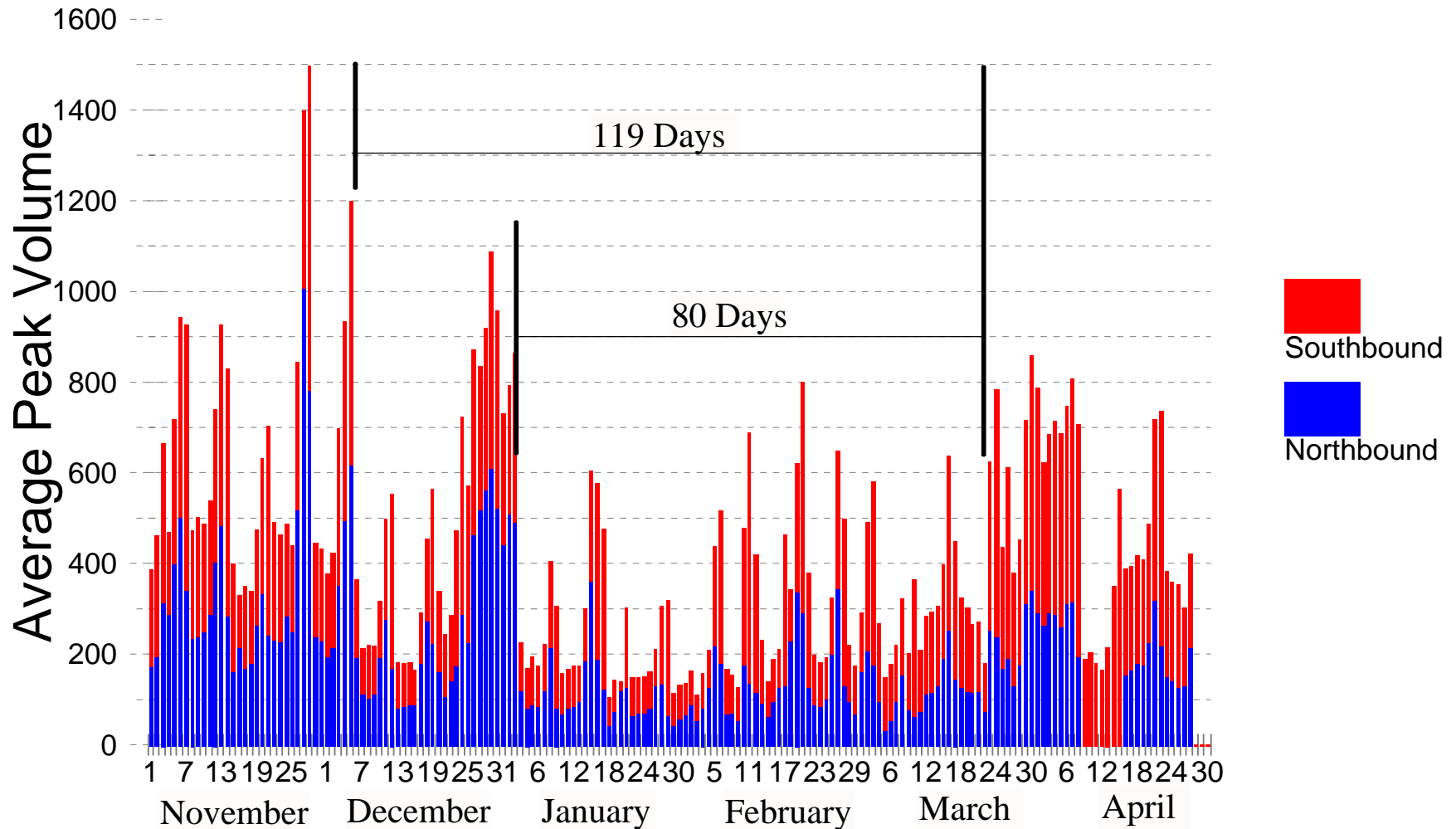
Ave. Depth of Cut = 4 feet



TYPICAL PROPOSED TUNNEL SECTION

Average Peak Hourly Volumes by Date

November 1999 to April 2000



Design

- **1000-1500' Approach Work**
- **Rockbolts for Stability During Blasting**
- **Design Research/Technology**
 - Sample Tunnel Lining
 - Ground Penetrating Radar
 - Rock Milling
 - Pavement and lining cores
- **Improved drainage system design**
- **Permanent VMS**
- **Maximize Construction Schedule (Phased)**

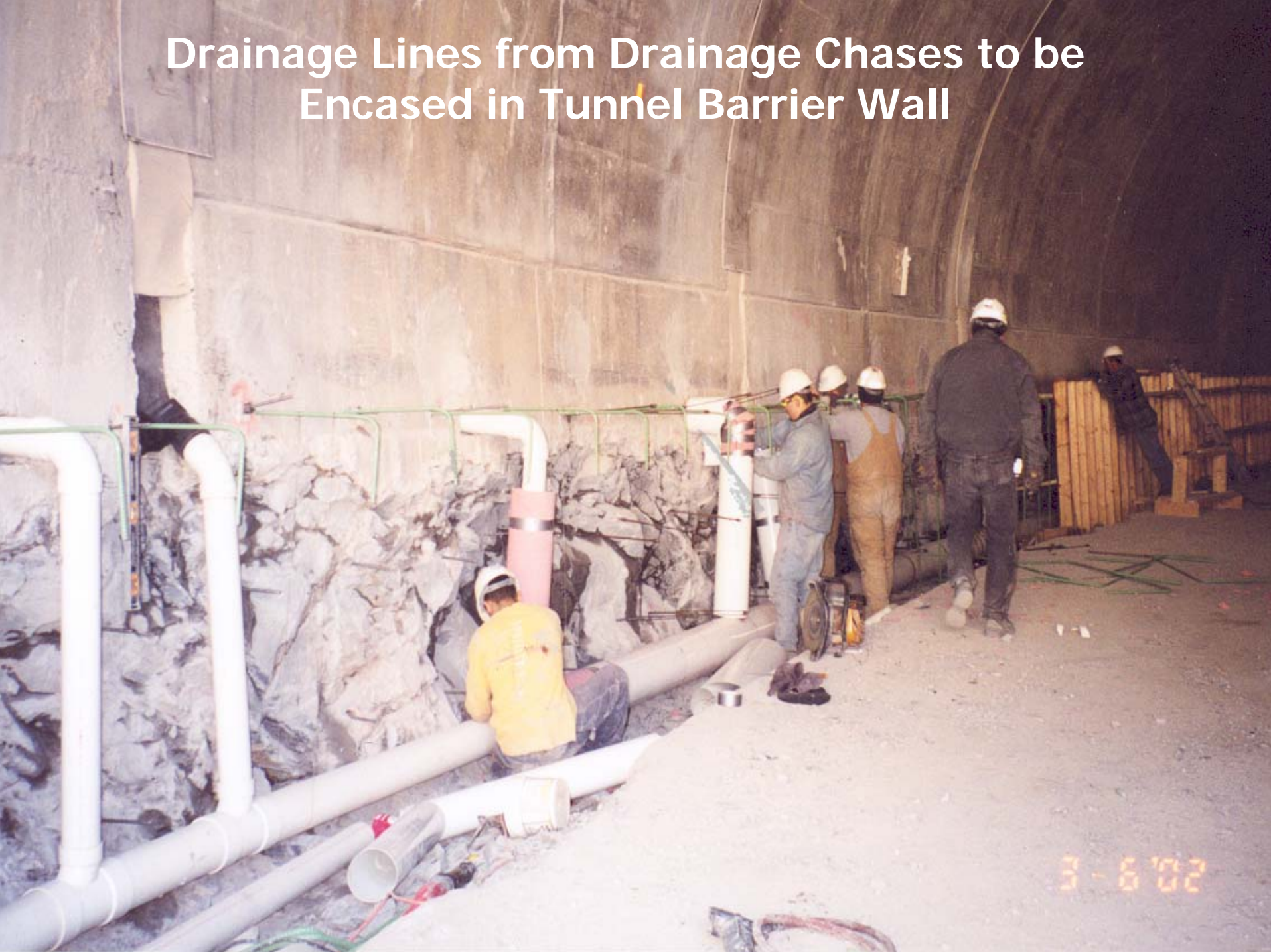
Contract

- **Multiple Shifts Necessary to Complete Work**
- **Incentive/Disincentive Clause**
- **Partnering**
 - ✓ Weekly progress meetings with NPS, FHWA, and Contractor
 - ✓ Contractor promise of bonuses to employees

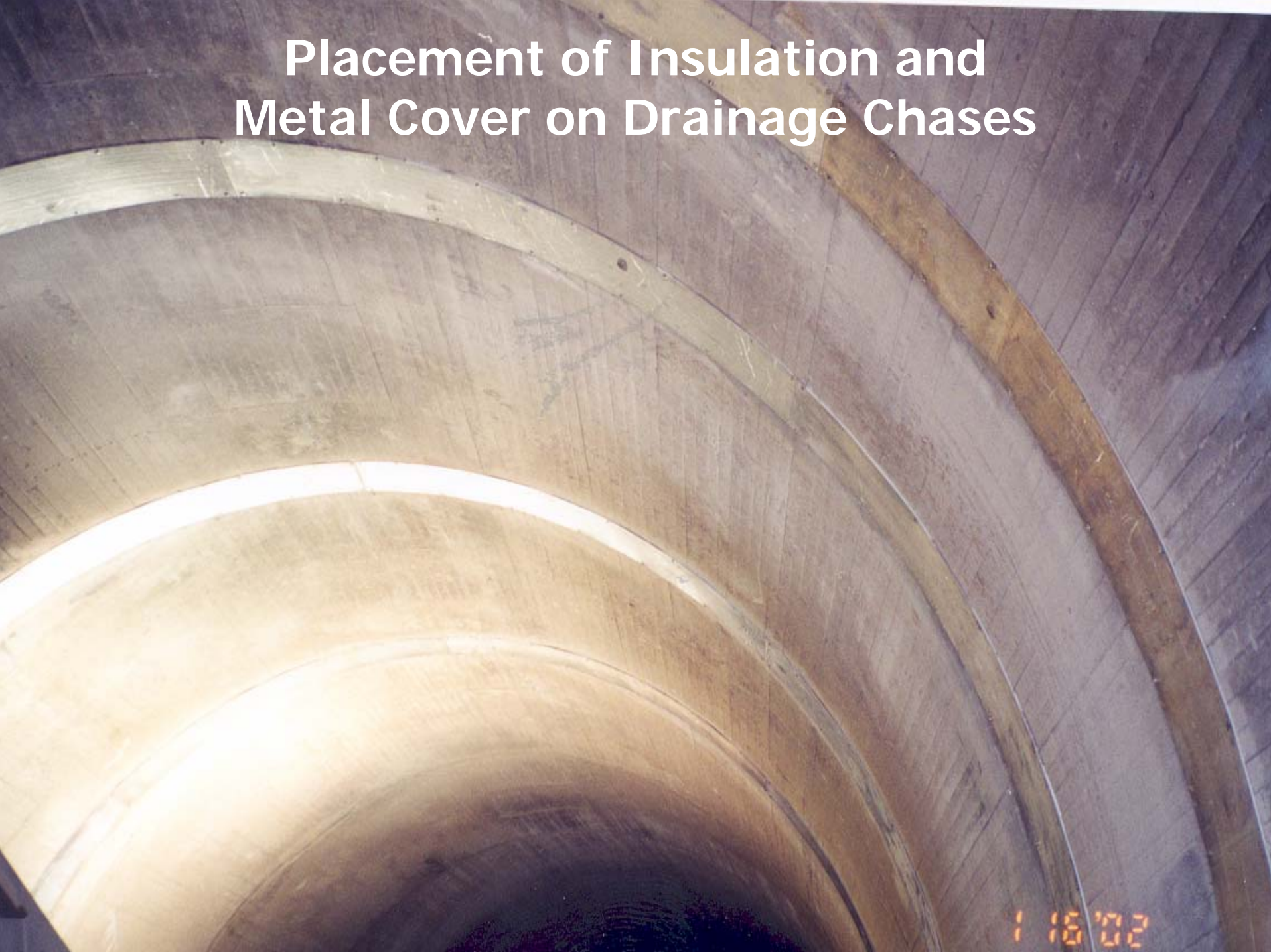
Tunnels Under Construction



Drainage Lines from Drainage Chases to be Encased in Tunnel Barrier Wall



Placement of Insulation and Metal Cover on Drainage Chases



Current Status

- 100% complete
- 100% Incentives earned
- Final Cost = \$7.95 M



BEFORE



AFTER





Chimney Tops Mountain Tunnel



Morton Mountain Tunnel

Best Practices

- Partnerships – FLH, NPS, Tribe, TNDOT, NCDOT, and Contractors
- Public Involvement
- Progress Meetings w/TNDOT, NCDOT, Tribe, local trans. and citizen boards
- Contractor Design/Construction Input
- Design Research
- Contracting Methods
- Public Information
- Construction Partnering

Public Involvement

- Public Information Meetings
- Newspaper Releases
- Television Coverage
- Construction Brochures
- GRSM Website Construction Notices
- State Traveler Information Websites
- Permanent and Temporary Variable Message Signs

Added Value

- Partnerships strengthened (DOTs, Tribe, NPS, and Contractors) for future
- Design and historic preservation issues resolved for future projects (guardwalls)
- Technology – Parkwide ITS Initiated, Feedback from Design Research
- Public's opinion and trust strengthened in the NPS and FHWA.
- True and Continuous Team Effort

For More Information, Please Contact

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